



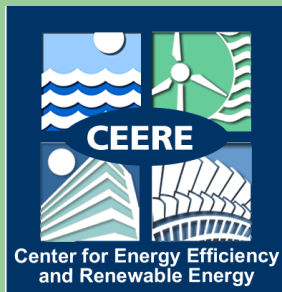
Industrial Assessment Center (IAC) Program

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Industrial Assessment Center

Mechanical & Industrial Engineering Department

University of Massachusetts - Amherst



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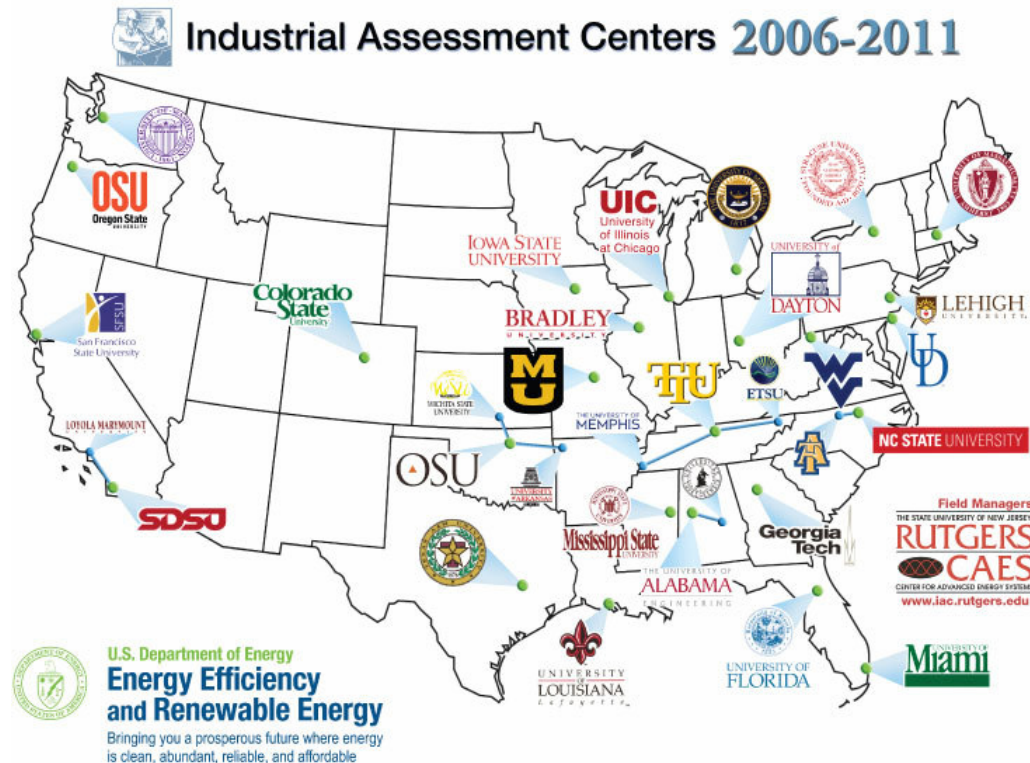
Cleaner Technology and Energy Efficiency:
Structuring a Competitive Advantage

April 5, 2007

Holiday Inn, Boxborough, MA



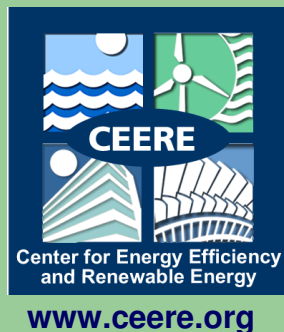
Beginning in 1984 with four Schools



Currently 26 Schools in the program

- For more information on IAC program and participating schools visit:

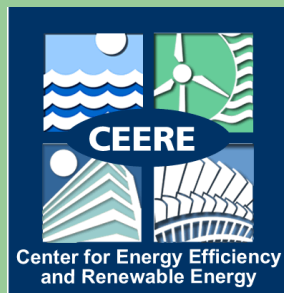
<http://iac.rutgers.edu/database/centers.php>





Industrial Assessment Center at the University of Massachusetts

- Provides assistance to New England Industry since 1984
- US DOE Funding allows the IAC Program to provide no cost energy conservation, waste prevention and productivity assistance to small and medium sized industrial firms within S.I.C. 20 through 39

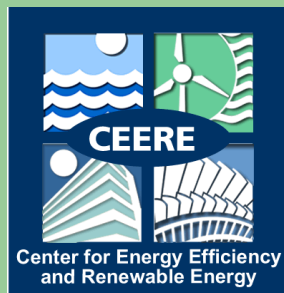


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IAC Program Goals

- Reduce Industrial Energy Use
- Reduce waste and prevent pollution in manufacturing operations
- Raise productivity
- Lower Operating Costs
- Increase Profitability
- Provide Professional Training for Students



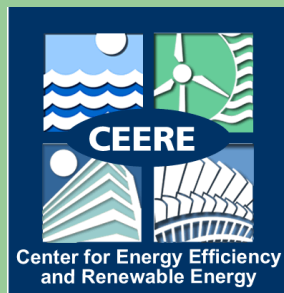
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Client Criteria

- Have Annual Energy Costs Less Than \$ 2.5 Million
- Have Gross Sales Less Than \$100 Million
- Have Less Than 500 Employees
- Have No In-house Energy Staff
- Be Within 150 Miles of Amherst, MA

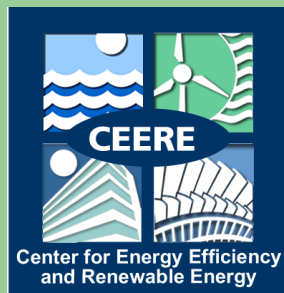


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UMASS Clients 1984-2004

- Over 615 plants visited since 1984
- Over \$11.3 billion in gross annual sales
- \$287 million in annual energy costs
- 76,500 employees
- Over 2,500 recommendations with \$62,000 average annual cost savings per assessment
- \$125,000 average savings per assessment in 2005-2006

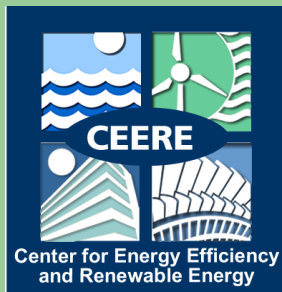


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Assessment Scenario

- Identify Interested Plant
- Schedule Plant Visit
- Obtain Historic Data
 - Electrical
 - Fuel Oil
 - Natural Gas
 - Water
 - Waste
- Visit Plant with Assessment Team
- Collect Plant Data
- Plant Review With Client
- Identify Assessment Recommendations
- Estimate Energy and Waste Savings
- Find Productivity Gains
- Prepare Report for Client



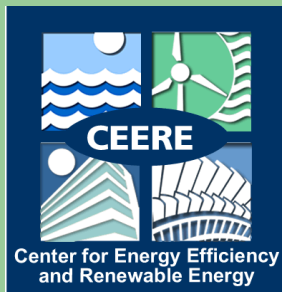
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Plant Energy Use

- How Do They Use It?
- When Do They Use It?
- Should Its Use Be Modified?
- Are There More Efficient Methods?
- Can They Use Their Waste Energy?



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Plant Productivity


- What are Materials Handled?
- Where Do Bottle-necks Occur?
- Can Set-up Processes be Modified?
- Is There Inactive Production Use or Space?

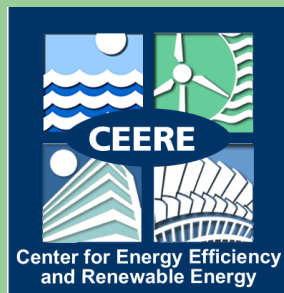


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Identifying Effective Energy Saving Options

- Major energy users
 - Major pieces of equipment
 - Motors
 - Boilers and Furnaces
 - Compressors/Chillers
 - Hot exhausts
 - Compressed air leaks
 - Cooling Towers
- 
- Variable Frequency Drives
 - Energy-efficient Motors
 - Consider CHP
 - Energy Management Systems
 - Steam Trap Replacement
 - High-efficiency Boiler
 - Chiller Water Plant Operation
 - Process Heat Recovery

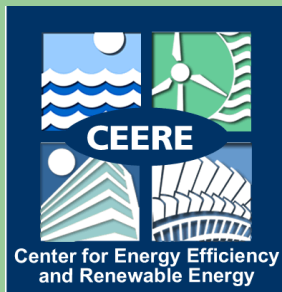


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Top \$ Savers

- Switch From Electrical To Fossil Fuels
- Convert To VSD For Pumps & Blowers
- Process Heat Recovery
- Use High Efficiency Lamps & Ballasts
- Reduce Fluid Flows
- Use Energy Efficient Equipment
- Consider Cogeneration
- Insulate Equipment



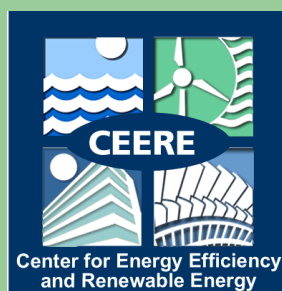
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Example:

Summary of Assessment Recommendations

Assessment Recommendation	Annual Savings	Annual Cost Savings	Implementation Cost	Payback Period
1. Implement CHP	Electricity: 4,938,100 kWh Demand: 5,449 kW Reliability: Natural Gas: -39,580 MMBtu Miscellaneous: Total: -22,726 MMBtu	\$ 434,553 \$ 27,245 \$120,000 -\$ 316,244 -\$ 99,886 \$ 165,668	Capital: \$ 960,460 Other: \$ 366,943 Total: \$ 1,327,403	8 years
2. Install VSD on Air Makeup Units	Natural Gas: 6,985 MMBtu Electricity: 294,200 kWh	\$ 55,810 \$ 25,890 \$ 81,700	Capital: \$ 15,040 Other: \$ 3,160 Total: \$ 18,200	3 months
3. Install VSD on Press Hydraulics	Electricity: 742,500 kWh Demand: 1,428 kW	\$ 65,340 + \$ 7,140 \$ 72,480	Capital: \$ 122,544 Other: \$ 35,361 Total: \$ 157,905	2.2 years
4. Replace Lighting Fixtures and Install Occupancy Sensor	Electricity: 314,000 kWh Demand: 604 kW	\$ 27,632 + \$ 3,020 \$ 30,652	Capital: \$ 9,815 Other: \$ 8,735 Total: \$ 18,550	7 months
5. Convert Electric Mold Preheat to Natural Gas	Electricity: 326,800 kWh Demand: 448 kW Natural Gas: -1,310 MMBtu	\$ 28,758 \$ 2,240 -\$ 10,467 \$ 20,531	Capital: \$ 14,250 Other: \$ 3,185 Total: \$ 17,435	10 months
6. Install Smaller Following Compressor	Electricity: 93,600 kWh Demand: 753 kW	\$ 8,237 + \$ 3,765 \$ 12,002	Capital: \$ 27,000 Other: \$ 2,888 Total: \$ 29,888	2.5 years
7. Turn Off Oven Exhaust when Cycle is Over	Natural gas: 1,166 MMBtu Electricity: 17,000 kWh Total: 1,224 MMBtu	\$ 9,316 \$ 1,496 \$ 10,812	Capital: \$ 720 Other: \$ 4,608 Total: \$ 5,328	6 months
8. Recover Compressor Waste Heat	Nat. Gas: 1,336 MMBtu	\$10,675	Capital: \$ 3,325 Other: \$ 1,350 Total: \$ 4,675	6 months

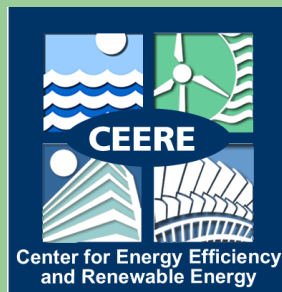


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Example (Cont.):

9. Implement Temperature Setback	Natural Gas: 1,190 MMBtu	\$ 9,508	Capital: \$ 115 Other: \$ 45 Total: \$ 160	1 week
10. Reduce Platen Temperature when Idle	Electricity: 58,700 kWh	\$5,166	Capital: \$ 0 Other: \$ 3,100 Total: \$ 3,100	7 months
11. Install Free Cooling for Scrubber	Electricity: 38,600 kWh Demand: 14 kW	\$ 3,397 \$70 \$ 3,467	Capital: \$ 6,900 Other: \$ 1,400 Total: \$ 8,300	2.5 years
12. Install VSD on Process Water Pump	Electricity: 32,200 kWh Demand: 60 kW	\$ 2,834 \$ 300 \$ 3,134	Capital: \$ 4,629 Other: \$ 1,800 Total: \$ 6,429	2 years
	Electricity: 6,855,700 kWh Demand: 8,756 kW Natural Gas: -30,213 MMBtu Reliability: Miscellaneous: Total: -6,814 MMBtu	\$ 603,303 \$ 43,780 \$ 241,402 \$ 120,000 \$ 99,886 \$ 425,795	Capital: \$1,164,798 Other: \$ 432,575 Total: \$ 1,597,373	



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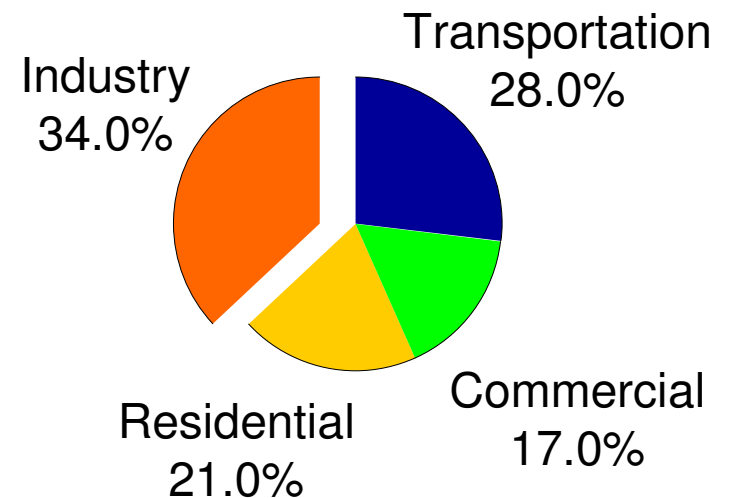


“Save Energy Now” Initiative

Industry: Critical to National Energy Policy

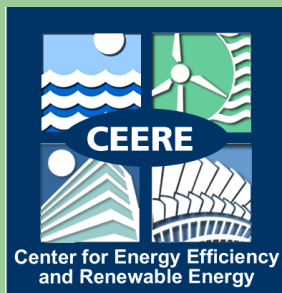
- 1/3 of U.S. **energy consumption**
- More than 40% of U.S. **natural gas demand**
- ~28% of U.S. **electricity demand**
- Energy is key to **economic growth** and maintaining **U.S. jobs** in manufacturing

2004 Energy Use*



*Includes electricity losses

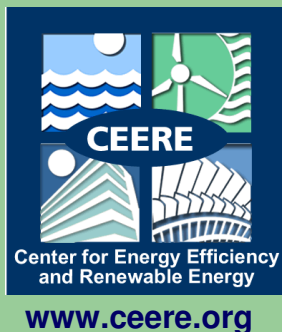
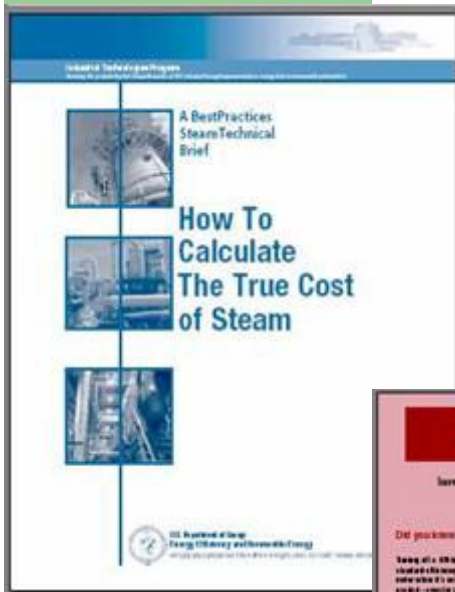
Source: DOE/EIA Monthly Energy Review 2004 (preliminary)



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Information, Tools and Training

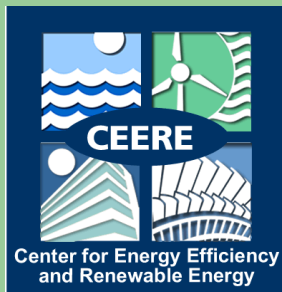


- Tip sheets, case studies, brochures, technical briefs etc.
- *Energy Matters* newsletter
- Industrial Technologies Monthly e-bulletin
- Software tools
- Training workshops and webcasts
- Web sites
- New:
 - Packets of Information for Plants
 - Save Energy Now CD



ITP BestPractices Tools

- Process Heating
 - PHAST (Process Heating Assessment and Survey Tool)
 - NxEAT (NO_x and Energy Assessment Tool)
 - Combined Heat and Power Application Tool
- Steam Systems
 - SSST (Steam System Scoping Tool)
 - SSAT (Steam System Assessment Tool)
 - 3E Plus – Insulation Assessment Tool

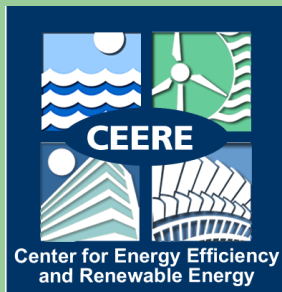


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ITP BestPractices Tools Continued

- Motor Driven Systems
 - CWSAT (Chilled Water System Assessment Tool)
 - AirMaster + (Compressed air system assessment tool)
 - FSAT (Fan System Assessment Tool)
 - MotorMaster + (Motor management tool)
 - PSAT (Pumping System Assessment Tool)
 - ChemPEP (Plant Energy Profiler for the Chemical Industry)



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Questions?

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